

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	34	"15"/\$.ccls. and lcd and (sonic or ultraso\$ or megaso\$)	US-PGPUB; USPAT; USOCR	ADJ	OFF	2005/06/01 10:57
L2	184	"134"/6.ccls. and (sonic or ultraso\$ or megaso\$)	US-PGPUB; USPAT; USOCR	ADJ	OFF	2005/06/01 10:58
L3	106	l2 and brush	US-PGPUB; USPAT; USOCR	ADJ	OFF	2005/06/01 10:58
L4	84	l3 and (panel or glass or lcd or substrate)	US-PGPUB; USPAT; USOCR	ADJ	OFF	2005/06/01 10:59

## WEST Search History

DATE: Wednesday, June 01, 2005

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<input type="checkbox"/>	L6	L5 and 6058544	2
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<input type="checkbox"/>	L4	15/\$.ccls. and lcd and (sonic or ultraso\$ or megaso\$)	29
<input type="checkbox"/>	L3	L2 and (sonic or ultraso\$ or megaso\$)	4
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L3: Entry 7 of 26

File: USPT

Nov 11, 2003

DOCUMENT-IDENTIFIER: US 6643882 B1  
TITLE: Substrate cleaning apparatus

Brief Summary Text (2):

The present invention relates to a substrate cleaning apparatus used for cleaning a substrate to be cleaned, such as a semiconductor wafer, a LCD or the like.

Brief Summary Text (3):

In this type of conventional substrate cleaning apparatus mentioned above, for example, such a configuration has been provided, which comprises a scrub cleaning tool for cleaning a wafer by rubbing a surface thereof with a brush or a sponge (cleaning tool), and a liquid jet spray nozzle for cleaning the wafer by jet-spraying high pressure water excited by ultrasonic vibration energy or cavitation onto the surface of the wafer, or the like. Each of these cleaning means are mounted on an individual arm, respectively, to be moved by a respective swinging arm between a center and a periphery of the wafer while rotating the wafer to clean the entire surface of the wafer.

Brief Summary Text (5):

On the other hand, another cleaning method for cleaning the wafer by jet-spraying high pressure water energized by ultrasonic wave or cavitation is effective on cleaning a rather clean wafer having several tens to several hundreds of dust particles attached on the surface thereof. This method is also effective on cleaning extremely contaminated wafer having several hundred thousands of initial dust particles, such as a semiconductor wafer just after CMP (chemical mechanical polishing) processing, which has been put to practical use as a planarization technology of multilayer wiring of the semiconductor device. This are because, different from the method using a brush or the sponge, there is no fear of reverse contamination and thereby, a dust level on the wafer can be certainly lowered. When both of the sponge and the ultrasonic wave are used simultaneously, dust which cannot be removed by either of them individually may be removed by the synergistic effect thereof.

Brief Summary Text (8):

In the scrub cleaning tool described above, a self-cleaning operation is necessary to remove dust attached to the brush or the sponge, and accordingly an additional container is required to reserve pure water for the self-cleaning, which requires additional space and brings negative effect on compactness of the apparatus.

Brief Summary Text (13):

Yet another object of the present invention is to provide a substrate cleaning apparatus which requires no additional equipment for cleaning a periphery or side surface of a substrate.

Brief Summary Text (16):

The present invention further provides another substrate cleaning apparatus for cleaning a rotating substrate, the substrate cleaning apparatus comprising a scrub cleaning tool for cleaning the substrate by bringing the cleaning tool into contact with the substrate, a swing mechanism for swinging the scrub cleaning tool on the substrate, and a cleaning tool vertical driving mechanism for moving at least the

cleaning tool from a position where the cleaning tool is in contact with a surface of the substrate to another position where the cleaning tool is in contact with a side surface of the substrate, by vertically moving the cleaning tool.

Drawing Description Text (10):

FIG. 8 is a schematic view showing a cleaning operation for cleaning a side surface of the semiconductor wafer by the sponge;

Detailed Description Text (46):

In addition, when the sponge 15 is moved near to the periphery of the wafer W (that is, near to the point "a" or "b") by swinging the arms 11 and 33, and then the arm 11 is lowered by the cleaning tool vertical driving mechanism 17 so that the sponge 15 is located in a position shown in FIG. 8, and a peripheral side surface of the rotating semiconductor wafer W is rubbed with a side surface of the rotating sponge 15, the peripheral side surface of the semiconductor wafer W can be cleaned efficiently. If this cleaning process is conducted when the sponge 15 is at the point "a" or "b" immediately before or after the scanning operation of the semiconductor W, both of the top surface and the side surface of the semiconductor wafer W can be cleaned in a single scanning process, which is preferable.

Detailed Description Text (52):

In this embodiment, the peripheral side surface of the semiconductor wafer W can be cleaned by the sponge 15 by lowering the sponge 15 at a position near to a periphery of the semiconductor W, and the self-cleaning of the sponge 15 by the nozzle 31 can be conducted by selecting an lifted-up position of the nozzle 31 such that a cleaning liquid jet-sprayed from the nozzle 31 in the lifted-up position is directed to the cleaning tool or the sponge 15.

Detailed Description Text (54):

As a holding and rotating mechanism of the semiconductor wafer W, various types of holding and rotating mechanisms other than the vacuum chuck mechanism 73 may be employed, such as a catch chuck mechanism for chucking the periphery of the semiconductor wafer W by a plurality of catches 101 to rotate the semiconductor wafer W as shown in FIG. 10(a), and a roller chuck mechanism for chucking the periphery of the semiconductor wafer W by a plurality of rotatable rollers 103 to rotate the semiconductor wafer W as shown in FIG. 10(b) (the semiconductor wafer W can be rotated by rotatively driving at least one of the rollers 103). In the case where the rollers 103 are employed, a back surface of the semiconductor wafer W can be cleaned simultaneously by a cleaning tool 105 comprising a cylindrical sponge (brush).

Detailed Description Text (68):

Though the examples for cleaning the semiconductor wafer W as a substrate are described in each of the above embodiments, these may be applied to clean other various substrates such as LCDs or the like.

Detailed Description Text (83):

3) The peripheral side surface of the substrate can be easily cleaned.

Current US Original Classification (1):

15/77

Current US Cross Reference Classification (1):

15/102

Current US Cross Reference Classification (2):

15/88.2

Current US Cross Reference Classification (3):

15/88.3

## CLAIMS:

10. A substrate cleaning apparatus claimed in claim 1, wherein said scrub cleaning tool has a bottom surface for cleaning the top surface of the substrate and a side surface for cleaning the peripheral edge of the substrate.

11. A substrate cleaning apparatus for cleaning a rotating substrate having a top surface and a peripheral edge, said substrate cleaning apparatus comprising: a chuck mechanism for chucking the substrate for supporting and rotating the substrate; a scrub cleaning tool for cleaning the substrate by being brought into contact with the substrate? wherein said scrub cleaning tool has a bottom surface for cleaning the top surface of the substrate and a side surface for cleaning the peripheral edge of the substrate; a swing mechanism for swinging said scrub cleaning tool on the substrate; and a cleaning tool vertical driving mechanism for moving said scrub cleaning tool, from a position where said scrub cleaning tool is in contact with the top surface of the substrate to another position where said scrub cleaning tool is in contact with the peripheral edge of the substrate, by vertically moving said scrub cleaning tool.

19. A substrate cleaning apparatus claimed in claim 15, wherein said scrub cleaning tool has a bottom surface for cleaning the top surface of the substrate and a side surface for cleaning the peripheral edge of the substrate.

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L6	29	"15"/\$.ccls. and ((side with brush) same (sonic or ultraso\$ or megaso\$))	US-PGPUB; USPAT; USOCR	ADJ	OFF	2005/06/01 11:45